DOCUMENT RESUME

ED 293 863 TM 011 433

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TITLE Validity of the Secondary School Improvement Program Effective Schools Survey.
PUB DATE [87]
NOTE 20p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Educational Assessment; *Educational Improvement; Factor Analysis; High Schools; *Improvement Programs; *School Effectiveness; School Surveys; *Secondary Education; Secondary School Teachers; *Test Validity; Theory Practice Relationship
IDENTIFIERS *District of Columbia Public Schools; *Secondary School Improvement Program Survey

ABSTRACT

The validity of the Secondary School Improvement Program Effective Schools Survey (SSIPESS) was studied, which is based on the Santa Clara County School Effectiveness Program. The SSIPESS, designed for the secondary school level, is an 85-item survey designed for teachers; and it varies from a three- to five-point scale, with eight underlying factors. The purpose of the study was to determine if: (1) the theoretical factors that underlie the instrument are identical to those empirically derived; and (2) the appropriate underlying factors maximize differences among schools. The SSIPESS was administered to 580 teachers in 11 senior high schools in the District of Columbia Public Schools. The matrix of intercorrelations of the items that make up the scale was subjected to principal components analysis with varimax rotation. Discriminant function analysis determined the discriminating power of the appropriate underlying factors. The results show that the theoretical factors were not identical to those empirically derived and that while only 42.8% of the variance was explained by the seven extracted factors, the instrument has high reliability and great discriminating power. Implications for using theoretically derived factors in deriving meaning from scales are discussed. (SLD)

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ED293863

Validity Of The Secondary School Improvement Program Effective Schools Survey

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Abstract

Several instruments have been developed for measuring aspects of school effectiveness. However, psychometric properties of most of these instruments are unavailable. While the school effectiveness instruments (Teacher, Parent, and Student forms) developed by the Santa Clara County School Effectiveness Program are comprehensive, they have two limitations: (1) they are designed only of the elementary and junior high school levels and (2) there is no evidence of attempts to validate the theoretical constructs which underlie any of their three forms.

The instrument under investigation in this study, the Secondary School Improvement Program Effective Schools Survey (SSIPESS) was based on the Santa Clara County School Effectiveness Model. However, it was designed for the secondary school level.

The purpose of the study was to (1) determine whether the theoretical factors that underlie the instrument are identical to those derived empirically and (2) to ascertain whether the appropriate underlying factors maximize differences among schools. The matrix of intercorrelations of the items that make up the scale was subjected to principal components analysis with varimax rotation. Discriminant function analysis was utilized to determine the discriminating power of the appropriate underlying factors. The results show that the theoretical factors were not identical to those derived empirically and that while only 42.8% of the variance was explained by the seven extracted factors, the instrument has high reliability and great discriminating power. Implications for utilizing theoretically derived factors in deriving meaning from scales are discussed.

Validity Of The Secondary School Improvement Program Effective Schools Survey

Contrary to the interpretation of the Coleman Report (Coleman et al., 1966), a large body of literature that has been amassed during the last fifteen years show that the school can make a difference (Corcovan 1985; Edmonds, 1977). The rapid influence of the school improvement movement across the country is evidence of a change of sorts about the role of the school in student achievement. In the past, school improvement efforts were geared toward elementary schools. More recently, these efforts have been extended to the secondary school level. In 1984, the District of Columbia Public Schools (DCPS) advanced its school improvement efforts to its secondary grades. The instrument under investigation in this study, the Secondary School Improvement Program Effective Schools Survey (SSIPESS) was designed to support this effort. It is part of a comprehensive evaluation plan to assess the impact of the Secondary School Improvement Program at DCPS.

Several instruments have been developed for measuring aspects of school effectiveness (cf. Evans & Geisel, 1984; Guzzetti, 1983). However, data pertaining to the psychometric properties of most of these instruments are unavailable. The school effectiveness instruments developed by the Santa Clara County School Effectiveness Program are not only comprehensive but psychometrically sound (cf. Weil & Pruyn, 1984). The fourteen factors which theoretically underlie their instruments were based on research findings on studies of effective schools. These factors include Opportunity To Learn, Tightly Coupled Curriculum, Effective Instruction, Clear Academic Focus And Mission, Instructional Leadership, High Expectation, and Safe and Orderly Environment. However, there is no evidence of attempts to validate the theoretical constructs which underlie any of the three forms (Teacher, Student, and Parent) of their instrument. Also, their instruments were designed only for the elementary and junior high school levels.

The instrument under investigation in this report was designed for the secondary school level. However, while the items on this instrument were primarily adapted from the Santa Clara County Effectiveness Program instruments, only eight of their fourteen theoretical factors were utilized.

The Instrument

The instrument of interest in this study, the SSIPESS is an 85-item survey designed for teachers. The response categories on this instrument varies from a 3-point to a 5-point scale. Theoretically, eight factors underlie the instrument. These factors are:

1. Opportunity To Learn
2. Expectations And Standards
3. Home-School Relations
4. Safe And Orderly Environment
5. Effective Instruction
6. Clear School Mission
7. Tightly Coupled Curriculum
8. Monitoring Student Progress

Table I

Theoretical Structure Of The SSIPESS And The Number Of Items That Constitute Each Factor

Factors		Number of Items
I	Opportunity To Learn	
	Protects Instructional Time	6
	Homework	4
	Success Rate	3
II	Expectations and Standards	
	Expectations for Student Success	7
	Student Motivation	3
	Teacher Efficacy	6
	Performance Standards	2
III	Home-School Relations	8
IV	Safe and Orderly Environment	
	School Safety	7
	Rules and Enforcement	4
	Classroom Management	4
V	Effective Instruction	6
VI	Clear School Mission	6
VII	Tightly Coupled Curriculum	
	Alignment with Instruction	7
	Alignment With Testing Materials	3
VIII	Monitoring Student Progress	
	Systematic Procedures	5
	Uses of Procedures	4

Table I shows the factors and the number of items on the instrument that make up the subscales.

The instrument is intended to be utilized as both a unidimensional and a multidimensional measure of the effective school construct. Total effective score is computed by summing weighted response categories of items which comprise the instrument. The assigned weights depend on the direction of the item with respect to effective school characteristic or procedure and the number of response categories.

The response categories are arranged either in increasing or decreasing order of magnitude. As a result, the direction of the item (positive or negative) determines whether the assigned weights increase or decrease as one moves down the response categories. The importance of the number of response categories on an item in assigning weights is evidenced by the fact that these categories vary from a 3-point to a 5-point scale within the instrument. For example, an item on the SSIPESS reads:

> "If I try hard, I can get even the most unmotivated student to make good academic progress"
>
> A. Definitely True
> B. Mostly True
> C. Not Sure
> D. Mostly Not True
> E. Definitely Not True

The direction of the item with regard to effective school characteristic or procedure is positive and the response categories are arranged in decreasing order of magnitude. Thus, to place all the items on the instrument on a 10-point scale, the following weights would be applied to response categories A, B, C, D, and E: 9.74, 7.62, 5.5, 3.36, and 1.26. The assigned weights would be reversed if the response categories were rearranged in an increasing order of magnitude with respect to effective school characteristic or procedure.

On the other hand, if the direction of the item is positive and there were four response categories arranged in decreasing order of magnitude, the following weights would be applied to the response categories (in this instance, A, B, C, and D): 9.17, 6.73, 4.28, and 1.83.

The SSIPESS was designed to support secondary school improvement efforts. As such, while it may be utilized as either a unitary measure or a multidimensional one, its utility in determining aspects of effective school construct is of utmost importance. This importance of the underlying dimensions of the instrument is reflected in the focus of the study reported herein.

Purpose of the Study

The purpose of the study is two-fold:

1. to determine whether the theoretical factors which underlie the SSIPESS are identical to those derived empirically, and

2. to ascertain whether the appropriate underlying factors maximize differences among schools.

Method

Participants

Five hundred and eighty teachers in eleven senior high schools in the District of Columbia Public Schools participated in the study. They constitute about 70 percent of the teachers at the high schools they represent. Sixty-two percent of the sample are instructors in major subject areas such as English, mathematics, social studies, science, and foreign language.

Procedures

Data for the study were collected in each of the eleven schools during the Spring of 1987. The entire classroom teacher population at the schools was targeted. Principals were informed, in advance, of the day that data collection would take place since the survey instrument was administered in groups.

In seven of the eleven schools, a research assistant administered the instrument to small groups of teachers during their scheduled planning periods throughout the school day. In the remaining schools, the survey was administered to all the teachers at the end of the school day.

Data Analyses

A preliminary analysis undertaken to examine the reliability of the instrument revealed that 15 of the 85 items that make-up the scale either correlated low ($r < .2$) or negatively with total effective score. As a result, these variables were eliminated from subsequent analyses.

Internal consistency reliability of the remaining 70 items was examined using SPSSX subroutine RELIABILITY (SPSS Inc., 1986). To determine the factorial structure of the items which make-up the scale, the matrix of the intercorrelations among the remaining 70 items were subjected to principal components analysis. Varimax rotation was performed using the same SPSSX subroutine. Convergence was reached after nine iterations. The factorial complexity of the scale was explored by considering

loadings with absolute values greater than or equal to .30, which accounted for approximately 10% of the variance.

Since the empirically derived factors were not identical to the theoretically derived ones, SPSSX subroutine DISCRIMINANT was subsequently utilized to determine whether or not the derived factors maximize differences among schools.

Results

The factorial structure of the SSIPESS after elimination of the 15 items from the instrument is shown in Table II.

Table II

Theoretical Structure of the SSIPESS and the Number of Items That Constitute Each Scale After Elimination of Fifteen Items

Factors		Number of Items
I	Opportunity To Learn	
	Protects Instructional Time	3
	Homework	2
	Success Rate	3
II	Expectations and Standards	
	Expectations for Student Success	6
	Student Motivation	5
	Teacher Efficacy	3
	Performance Standards	1
III	Home-School Relations	8
IV	Safe and Orderly Environment	
	School Safety	7
	Rules and Enforcement	4
	Classroom Management	3
V	Effective Instruction	0
VI	Clear School Mission	6
VII	Tightly Coupled Curriculum	
	Alignment With Instruction	7
	Alignment With Testing Materials	3
VIII	Monitoring Student Progress	
	Systematic Procedures	5
	Uses of Procedures	4

As Table II shows, the 15 items which were eliminated were unevenly distributed among the theoretical factors. Four of the theoretical factors: Home-School Relations, Clear School Mission, Tightly Coupled Curriculum, and Monitoring Student Progress were not affected in the item eliminations. One item was eliminated from Safe And Orderly Environment, three from Expectations And Standards, and five from Opportunity To Learn. However, the most greatly affected was the Effective Instruction factor. All the items that subsumed under this factor failed to meet the inclusion criteria for subsequent analyses.

With the elimination of the 15 items, an internal consistency reliability analysis of the remaining items resulted in Cronbach's alpha of .94. However, the internal consistency reliability of the individual subscales ranged from .52 to .74 with the exception of Protects Instructional Time and Homework which were .43 and .27 respectively.

Factor Analysis

To determine the dimensionality of the instrument, factor analytic statistical procedure was utilized. Seven interpretable orthogonal factors were extracted. Table III shows the factors and the items which loaded under each.

Table III

Empirically Derived Factors and the Factor Loading of Items Which Load Under Each

Factors	Factor Loading
Factor I: Monitoring of Student Progress	
V27	.70
V31	.68
V16	.66
V30	.65
V10	.64
V24	.62
V33	.61
V23	.60
V28	.55
V32	.53
V6	.52
V4	.49
V7	.48

Table III (Continued)

Factors	Factor Loading
Factor 1: Monitoring of Student Progress	
V20	.48
V26	.46
V15	.44
V5	.42
V22	.41
V13	.39
V9	.37
V29	.35
V70	.35
V41	.35
Eigenvalue = 15.3	
Percent of Variance = 21.9	
Factor 2: Tightly Coupled Curriculum	
V39	.69
V42	.66
V44	.61
V77	.61
V43	.59
V40	.53
V12	.51
V41	.48
V20	.45
V17	.43
V38	.39
V23	.39
V35	.38
V18	.35
V4	.34
Eigenvalue = 4.46	
Percent of Variance = 6.4	

Table III (Continued)

Factors	Factor Loading
Factor 3: Orderly Environment	
V65	.77
V53	.70
V62	.67
V59	.60
V63	.54
V57	.50
V71	.50
V74	.50
V54	.41
V64	.37
V58	.36
V48	.35
V72	.31
V60	.30
Eigenvalue = 2.79 Percent Of Variance = 4.0	
Factor 4: Expectations and Standards	
V47	.71
V61	.65
V68	.57
V60	.55
V58	.54
V80	.54
V45	.52
V52	.51
V71	.39
V64	.38
V12	.37
V57	.33
Eigenvalue = 2.27 Percent of Variance = 3.2	

Table III (Continued)

Factors	Factor Loading
Factor 5: Safe Environment	
V19	.68
V21	.67
V14	.60
V51	.55
V66	.52
V35	.41
V63	.40
V48	.39
V49	.32
Eigenvalue = 1.89 Percent of Variance = 2.7	
Factor 6: Home-School Relations	
V3	.62
V5	.41
V13	.31
V38	.30
Eigenvalue = 1.70 Percent of Variance = 2.4	
Factor 7: Using Test Data	
V20	.40
V10	.38
V7	.34
V13	.31
Eigenvalue = 1.53 Percent of Variance = 2.2	

Factor 1 was labeled Monitoring Of Student Progress because the items which loaded high on this factor suggest that systematic procedures are in place for using test data in monitoring progress of students. This factor accounted for 21.9% of the variance.

Factors 2 and 3 were labeled Tightly Coupled Curriculum and

Orderly Environment respectively. Items that loaded high on factor 1 suggest that curriculum materials are in alignment with instruction. Factor 3 was labeled Orderly Environment because the high loading items on this factor indicate that classroom management procedures are in place and are enforced effectively and fairly. Tightly Coupled Curriculum explained 6.4% of the variance and Orderly Environment accounted for 4.0% of the variance.

Expectations and Standards, the label for factor 4, accounted for 3.2% of the variance. Factor 5 was labeled Safe Enviroment. The high loading items on this factor dealt with safe climate around the school. It explained 2.7% of the variance while Home-School Relations, the label for Factor 6 accounted for 2.4% of the variance. Factor 7 was labeled Using Test Data; it accounted for 2.2% of the variance.

Discriminant Analysis

To determine whether or not the seven derived factors differentiate between schools, discriminant function analysis was performed. The derived factors were used as predictors and school was utilized as the group factor.

Seven discriminant functions were obtained. Four of the functions were statistically significant and explained 41%, 31%, 17%, and 6% of the between groups variability respectively. A highly significant discriminating power was obtained with none of the functions removed, X^2 (70) = 348.02, $p < .001$. After removal of the first discriminant function, there was still significant discriminating power indicated by the X^2 (54) = 212.83 $p < .001$. With removal of the second and third discriminant functions, X^2 (40) = 106.37, $p < .001$, and X^2 (28) = 45.05 $p < .05$, were obtained respectively. These findings indicate that the third and fourth discriminant functions represent additional dimensions in separating groups.

The loading matrix in Table IV shows that the first discriminant function correlated highly with Factor 5 (Safe Environment) and moderately with Factor 1 (Monitoring Student Progress), while the second discriminant function is loaded moderately high with Factor 6 (Home-School Relations), Factor 5 (Safe Environment), Factor 3 (Orderly Environment) and Factor 4 (Expectations And Standards). The third discriminant function correlated most highly with Factor 1 (Monitoring Student Progress) and with Factor 6 (Home-School Relations). The fourth discriminant function correlated significantly with Factor 4 (Expectations And Standards), Factor 7 (Using Test Data) and Factor 2 (Tightly Coupled Curriculum).

Table 4

Correlations Betwenn Canonical Discriminant Functions and Discriminant Variables

	Discriminant Functions			
Factors	1	2	3	4
Factor 1	.36	-.10	.51*	.49
Factor 2	.26	-.22	-.16	.63*
Factor 3	.13	.39	-.03	.32
Factor 4	-.16	.35	.15	.72*
Factor 5	.77*	.39	-.11	.43
Factor 6	.24	.44	.17	.22
Factor 7	.29	.01	.35	.66*

*p < .05.

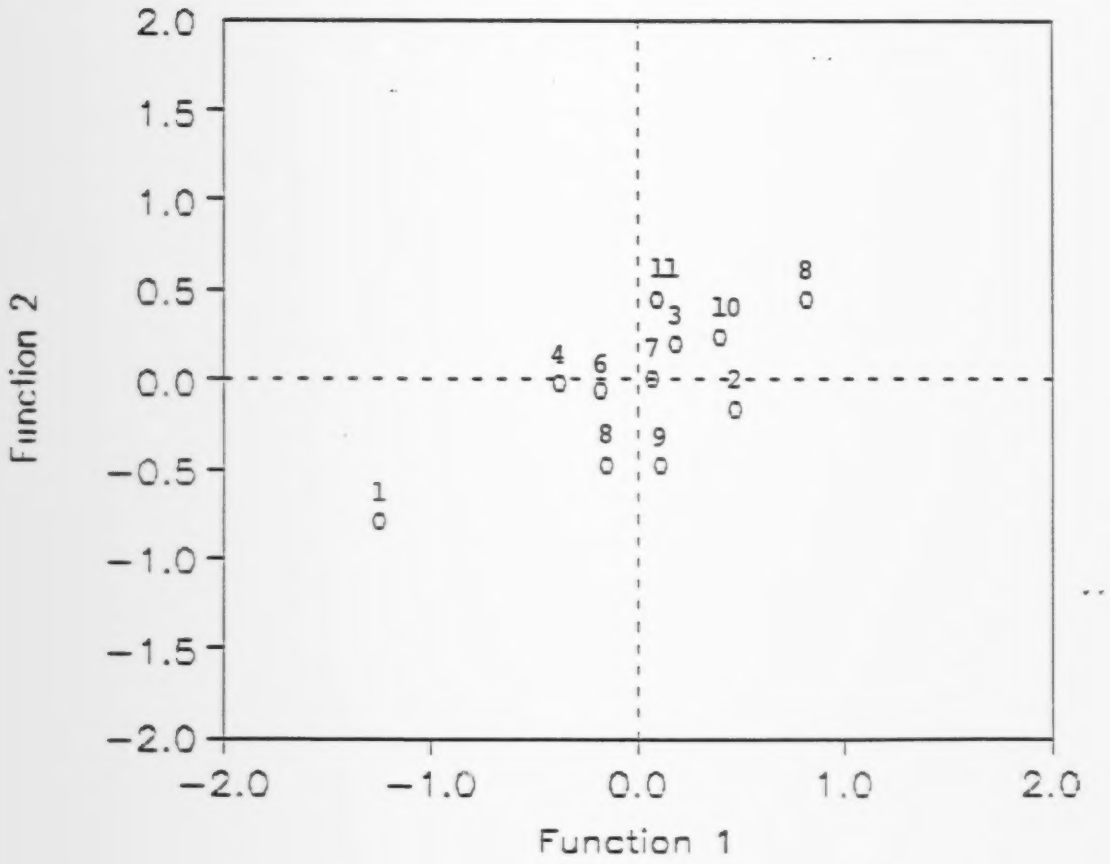
A plot of the locations of the eleven group centroids on three of the four significant discriminating canonical variables appear in Figures 1 and 2.

From Figure 1, it can be seen that function 1 distinguishes school 1 from the remaining schools and most clearly from school 5. In the same Figure, Function 2 distinguishes between three sets of school groupings. Set 1 comprise schools 11, 5, 3, and 10; set 2 consist of schools 4, 6, 7, and 2 while set 3 is made up of schools 8, 9, and 1.

Examination of the centroids in Figure 2 shows that function 1 separates school 5 from schools 3, 11, and 10; it also differentiates school 6 from school 2. In the same figure, Function 3 differentiates school 9 from schools 1 and 8.

These findings reveal that Safe Environment which is concerned with school safety and enforcement of rules is the primary factor which distinguishes school 1 from the remaining schools, and most clearly from school 5. Also, while Function 2 seems to cluster schools into small groups, Functions 1 and 3 maximize the separation of individual schools from these grouping sets. For instance, Monitoring Student Progress seems to be the major factor in maximizing the difference between school 9 and schools 1 and 8, while at the same time contributing to the separation of school 5 from the grouping set comprising of schools 3, 11, and 10.

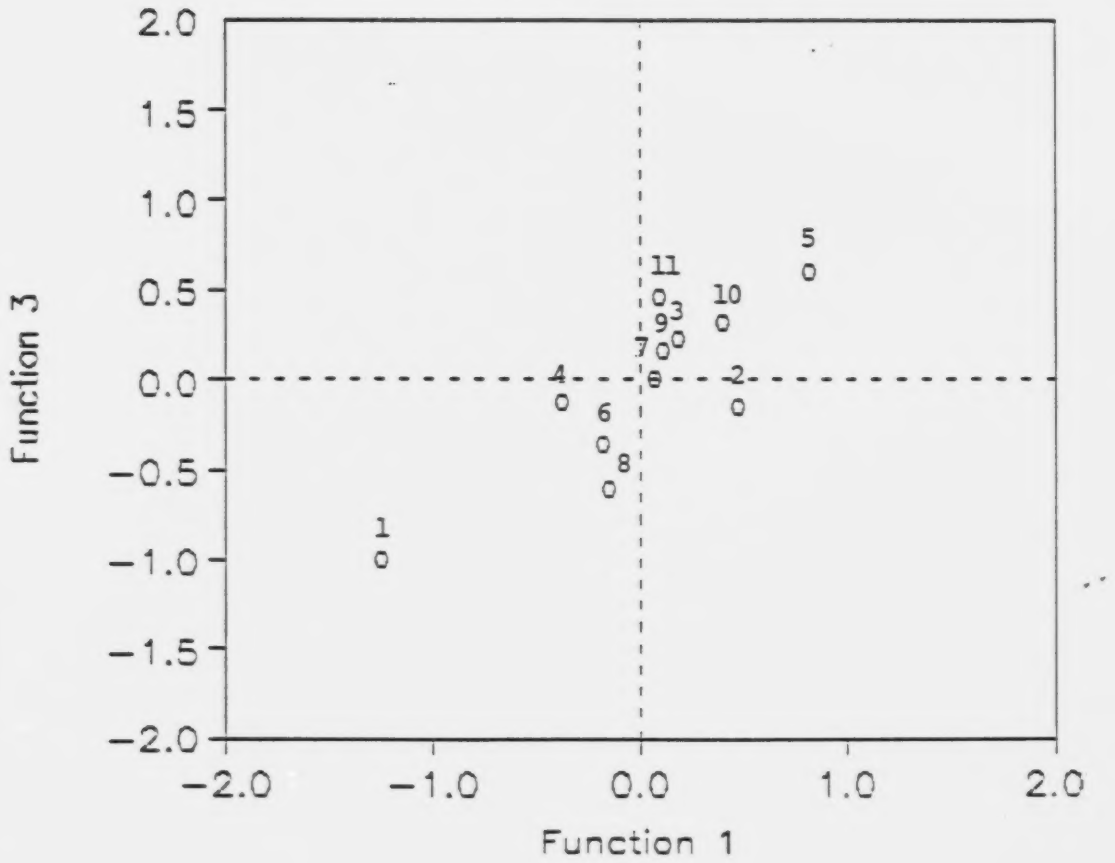
Figure 1: Group Centroids Functions 1 and 2



Key:
1 = School 1
2 = School 2
3 = School 3
4 = School 4
5 = School 5
6 = School 6
7 = School 7
8 = School 8
9 = School 9
10 = School 10
11 = School 11

16

Figure 2: Group Centroids Functions 1 and 3



Key:
1 = School 1
2 = School 2
3 = School 3
4 = School 4
5 = School 5
6 = School 6
7 = School 7
8 = School 8
9 = School 9
10 = School 10
11 = School 11

Discussion

Arbitrary use of factors of an instrument which are derived on logical or theoretical grounds presupposes that the factors are generalizable. If this assumption does not hold, then the information which is obtained by using the factors may be misleading. So while, it may be advisable to check the factorial structure of empirically derived scales, if there is reason to believe that the sample on which the instrument would be used is different from the normative one, it is crucial to verify the factor structure of newly developed instruments if deriving succinct meanings from the scales are essential. While the SSIPESS is designed to be utilized as both a unidimensional and a multidimensional measure, its major utility at DCPS is in the multidimensional realm. That is, its utility in supporting school improvement efforts by determining aspects of the effective schools construct in which individual schools are strong and/or weak in.

As such, a major purpose of this study is to determine whether the theoretical factors that underlie the SSIPESS are identical to those derived empirically. Use of factor analytic procedure revealed that while five of the empirical factors were labeled similar to the theoretically derived ones, the composition of the items which make up the empirically derived factors were different from those derived on logical grounds.

Also, while factors such as Opportunity To Learn, Clear School Mission, and Effective Instruction were never empirically extracted, it is interesting to note that theoretical factor Safe And Orderly Environment emerged as two empirical factors: Safe Environment and Orderly Environment. That is, the empirical findings distinguished enforcement of rules and safety on the school premises from order in the classroom (classroom management).

So, are the theoretical factors identical to the empirically derived ones ? No, because information obtained about aspects of a school from the theoretical structure would be very different from that obtained from the empirically derived one, at least as far as the sample used in this study is concerned.

A second major purpose of this study was to determine whether the factors which underlie the SSIPESS maximize differences among schools. This purpose is important because a measure which has little or no between group variability has minimal utility. The results of the discriminant function analysis demonstrate that the empirical factors actually maximize differences among schools.

So, the results show that the theoretical factors were not

identical to those derived empirically and that while only 42.8% of the variance was explained by the seven extracted factors, the instrument has high internal consistency reliability and moderately high discriminating power.

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